CLAIMS

[1]

A strain gauge type sensor characterized in that the sensor comprises:

a strain generation body comprising a force receiving portion to which a force is applied, a fixed portion fixed to a supporting body, and an interconnecting portion that interconnects the force receiving portion and the fixed portion and in which strain is generated according to the force applied to the force receiving portion;

a first strain gauge disposed on the interconnecting portion of the strain generation body; and

a second strain gauge disposed on the interconnecting portion at a position nearer to the fixed portion than the first strain gauge, and

the interconnecting portion has a shape such that the quantity of strain at the position where the first strain gauge is disposed is smaller than the quantity of strain at the position where the second strain gauge is disposed, when stresses equal in magnitude are applied to the position where the first strain gauge is disposed and the position where the second strain gauge is disposed.

[2]

The strain gauge type sensor according to claim 1, characterized in that the sensor comprises two first strain gauges and two second strain gauges, and

the first and second strain gauges are arranged on a single straight line.

[3]

The strain gauge type sensor according to claim 1 or 2, characterized in that the sensor comprises six first strain gauges and six second strain gauges, and

each set of two first strain gauges and two second strain gauges are arranged on each of three straight lines different from each other.

[4]

The strain gauge type sensor according to any of claims 1 to 3, characterized in that the force receiving portion is columnar, and

each of the fixed portion and the interconnecting portion is annular and disposed concentrically with the force receiving portion.

[5]

The strain gauge type sensor according to any of claims 1 to 4, characterized in that the interconnecting portion comprises:

a first diaphragm on which the first strain gauge is disposed;

a second diaphragm that is thinner than the first diaphragm and on which the second strain gauge is disposed; and

a connecting portion that is thicker than the first diaphragm and connects the first and second diaphragms to each other.

[6]

The strain gauge type sensor according to claim 5, characterized in that at least one of the difference in thickness between the first and second diaphragms and the difference in length between the first and second diaphragms, is set such that the quantity of change in resistance value of the first strain gauge is substantially equal to the quantity of change in resistance value of the second strain gauge when a force is applied to the force receiving portion.

[7]

The strain gauge type sensor according to any of claims 1 to 4, characterized in that the interconnecting portion gradually decreases in thickness from the position where the first strain gauge is disposed, toward the position where the second strain gauge is disposed.

[8]

The strain gauge type sensor according to claim 7, characterized in that the difference in thickness of the interconnecting portion between the position where the first strain gauge is disposed and the position where the second strain gauge is disposed, is set such that the quantity of change in resistance value of the first strain gauge is substantially equal to the quantity of change in resistance value of the second strain gauge when a force is applied to the force receiving portion.

[9]

The strain gauge type sensor according to any of claims 1 to 4, characterized in that a connecting portion between the force receiving portion and the interconnecting portion has a predetermined curvature, and a connecting portion between the fixed portion and the interconnecting portion has a curvature larger than the predetermined curvature.

[10]

The strain gauge type sensor according to claim 9, characterized in that the difference in curvature between the connecting portion between the force receiving portion and the interconnecting portion and the connecting portion between the fixed portion and the

interconnecting portion, is set such that the quantity of change in resistance value of the first strain gauge is substantially equal to the quantity of change in resistance value of the second strain gauge when a force is applied to the force receiving portion.

[11]

A strain gauge type sensor characterized in that the sensor comprises:

a strain generation body comprising a force receiving portion to which a force is applied, a fixed portion fixed to a supporting body, and an interconnecting portion that interconnects the force receiving portion and the fixed portion and in which strain is generated according to the force applied to the force receiving portion;

a first strain gauge disposed on the interconnecting portion of the strain generation body; and

a second strain gauge disposed on the interconnecting portion at a position nearer to the fixed portion than the first strain gauge, and

the first strain gauge is shorter than the second strain gauge.

[12]

The strain gauge type sensor according to claim 11, characterized in that the difference in length between the first and second strain gauges is set such that the quantity of change in resistance value of the first strain gauge is substantially equal to the quantity of change in resistance value of the second strain gauge when a force is applied to the force receiving portion.

[13]

A strain gauge type sensor characterized in that the sensor comprises:

a strain generation body comprising a force receiving portion to which a force is applied, a fixed portion fixed to a supporting body, and an interconnecting portion that interconnects the force receiving portion and the fixed portion and in which strain is generated according to the force applied to the force receiving portion;

a first strain gauge disposed on the interconnecting portion of the strain generation body; and

a second strain gauge disposed on the interconnecting portion at a position nearer to the fixed portion than the first strain gauge,

the interconnecting portion comprises:

a first diaphragm on which the first strain gauge is disposed;

a second diaphragm on which the second strain gauge is disposed; and

a connecting portion that connects the first and second diaphragms to each other, and

at least one of the difference in thickness between the first and second diaphragms, the difference in length between the first and second diaphragms, and the difference in length between the first and second strain gauges, is set such that the quantity of change in resistance value of the first strain gauge is substantially equal to the quantity of change in resistance value of the second strain gauge when a force is applied to the force receiving portion.

[14]

A strain gauge type sensor characterized in that the sensor comprises:

a strain generation body comprising a force receiving portion to which a force is applied, a fixed portion fixed to a supporting body, and an interconnecting portion that interconnects the force receiving portion and the fixed portion and in which strain is generated according to the force applied to the

force receiving portion;

a first strain gauge disposed on the interconnecting portion of the strain generation body; and

a second strain gauge disposed on the interconnecting portion at a position nearer to the fixed portion than the first strain gauge,

the interconnecting portion gradually decreases in thickness from the position where the first strain gauge is disposed, toward the position where the second strain gauge is disposed, and

at least one of the difference in thickness of the interconnecting portion between the position where the first strain gauge is disposed and the position where the second strain gauge is disposed, and the difference in length between the first and second strain gauges, is set such that the quantity of change in resistance value of the first strain gauge is substantially equal to the quantity of change in resistance value of the second strain gauge when a force is applied to the force receiving portion.

[15]

A strain gauge type sensor characterized in that the sensor comprises:

a strain generation body comprising a force receiving portion to which a force is applied, a fixed portion fixed to a supporting body, and an interconnecting portion that interconnects the force receiving portion and the fixed portion and in which strain is generated according to the force applied to the force receiving portion;

a first strain gauge disposed on the interconnecting portion of the strain generation body; and

a second strain gauge disposed on the interconnecting portion at a position nearer to the fixed portion than the first strain gauge,

a connecting portion between the force receiving portion and the interconnecting portion has a predetermined curvature, and a connecting portion between the fixed portion and the interconnecting portion has a curvature larger than the predetermined curvature, and

at least one of the difference in curvature between the connecting portion between the force receiving portion and the interconnecting portion and the connecting portion between the fixed portion and the interconnecting portion, and the difference in length between the first and second strain gauges, is set such

that the quantity of change in resistance value of the first strain gauge is substantially equal to the quantity of change in resistance value of the second strain gauge when a force is applied to the force receiving portion.

[16]

The strain gauge type sensor according to any of claims 1 to 15, characterized in that each of the strain gauges is made of a piezoresistive element.

[17]

A strain gauge type sensor unit characterized by comprising a plurality of strain gauge type sensors according to any of claims 1 to 16, on a single plane.

[18]

The strain gauge type sensor unit according to claim 17, characterized in that the plurality of strain gauge type sensors are arranged around a center point at regular angular intervals at the same distance from the center point.

[19]

The strain gauge type sensor unit according to claim 18, characterized in that the regular angular interval is 90 degrees.

[20]

The strain gauge type sensor unit according to

claim 18, characterized in that the regular angular interval is 120 degrees.